

APPLIED STATISTICS: Data Analysis

VOLUME II: GRAPHS

Master data analysis with a simple and effective method that allows for fast results and autonomy in your studies

- 1 **Simplified Essential Concepts**
- 2 **Illustrated step-by-step data analysis**
- 3 **The best free software for your analysis**



LEARN STATISTICS EASILY



APPLIED STATISTICS: Data Analysis
3 VOLUMES

Master data analysis with a simple and effective method that allows for fast results and autonomy in your studies

MasterCard VISA AMERICAN EXPRESS PAYPAL

~~\$47~~ \$27

MASTER DATA ANALYSIS QUICKLY, EFFORTLESSLY, AND WITH UNDENIABLE RESULTS

Discover our SIMPLE teaching method that will empower you to analyze your data on your own in no time.

We cover ALL the essential steps and only what's truly necessary for analyzing your data.

Built on the proven principle that it's entirely possible to accurately analyze data without complex concepts or formulas.

This book will serve you well, even if you have no prior knowledge of statistics. *All 3 volumes are included in this offer.*

**GET YOURS BY
CLICKING HERE!**



FORGET

EVERYTHING

YOU HAVE EVER

LEARNED ABOUT

STATISTICS

TO ANALYZE

YOUR DATA



Applied Statistics: Data Analysis (Volume II - Graphs) / Alves, Ana. - Learn Statistics Easily, 2023. 74 p. 2nd ed.

1. Statistics. 2. Biostatistics. 3. Learn Statistics Easily. 4. Applied statistics. 5. Data analysis. 6. Inferential statistics. 7. Descriptive statistics. 8. Graphs. 9. Sample size.

© 2023 Learn Statistics Easily

All rights reserved. This publication or any part of it may not be reproduced or used without the copyright holder's express permission.



Learn Statistics Easily
statisticseasily.com



PREFACE

Welcome to your ultimate guide to unlocking the power of data analysis – quickly, easily, and confidently.

This book presents a groundbreaking teaching method that empowers you to independently analyze your data with speed and precision.

We've distilled the essentials, providing only the necessary information to conquer data analysis without getting lost in complexities.

Say goodbye to intimidating concepts, formulas, and tables. This guide is designed to benefit you, even if your knowledge of statistics is limited.

Our innovative approach to "*learning data analysis quickly, easily, independently, and with confidence*" sets this book apart from the rest.

Let this guide be your invaluable companion as you embark on the exciting data analysis journey.



MASTERING OUR METHODOLOGY

(a) We distill only the most vital concepts, making them effortlessly understandable.

(b) Crystal-clear examples and diagrams bring each concept to life.

(c) Our algorithm for selecting statistical analyses and graphs is streamlined and straightforward.

(d) We tackle the most prevalent statistical analyses, covering 99% of real-world scenarios.

(e) Our detailed, step-by-step instructions, paired with vivid illustrations, make data analysis a breeze to grasp.

(f) Experience the ultimate in user-friendly, comprehensive, and intuitive free statistical software.





SUMMARY

1 **GETTING STARTED: ESSENTIAL KNOWLEDGE**

Grasp the key concepts in a simplified and accessible manner.

2 **TOP FREE STATISTICAL SOFTWARE**

Discover premier tools for data analysis, graphing, spreadsheets, and sample size calculations.

3 **DESCRIPTIVE STATISTICS: SUMMARY MEASURES**

Dive into the most vital measures for summarizing and showcasing your data.

4 **INFERENCE STATISTICS: UNLEASHING DATA ANALYSIS**

Learn to choose the right analysis and apply it with precision.

5 **PICKING THE PERFECT GRAPH (VOL. II)**

Follow a step-by-step guide to selecting and creating the ideal graph for your data.

6 **BONUS CONTENT & ADVANCED TOPICS (VOL. III)**

Delve into extra tips and explore slightly more sophisticated subjects.



TABLE OF CONTENTS - VOLUME II

1 WHAT SHOULD I KNOW TO GET STARTED?

1. The statistics.....	09
2. Analytical statistics.....	10
3. Variable & its types.....	11
4. Cause and effect.....	15

2 THE BEST FREE STATISTICAL SOFTWARE

1. The secret.....	18
2. Main software.....	19
3. Support software #1.....	20
4. Support software #2.....	21

3 HOW TO CHOOSE THE RIGHT GRAPH?

1. The basics.....	23
2. Now, follow these simple steps (flowchart).....	24
2.1 One quantitative variable (frequency).....	29
2.2 One qualitative variable (frequency).....	30
2.3 Two qualitative variables (frequency).....	31
2.4 Two quantitative variables.....	32
2.5 One qualitative and one quantitative variable.....	33
2.6 One ordinal qualit. and one quantitative variable.....	35

4 HOW TO MAKE YOUR GRAPH?

1. The most important rule!.....	37
2. Get your hands dirty!.....	39
3. [REDACTED] graphs.....	40
4. [REDACTED] graphs.....	50
5. [REDACTED] graphs.....	69



“

**ABOVE ALL
ELSE SHOW
THE DATA**

EDWARD ROLF TUFTE



learn statistics easily



CHAPTER 1

WHAT SHOULD I KNOW TO GET STARTED? *(déjà vu)*

2. ANALYTICAL STATISTICS

Analytical statistics can be divided into two parts:

(a) Descriptive statistics and

(b) Inferential statistics.

Descriptive statistics is a set of methods that describe and summarize collected data, making it easier to understand.

It uses tables, graphs, and measures to simplify and present the data.

On the other hand, **inferential statistics** is a set of analysis methods that allow for conclusions about a population based on a sample.

These methods include chi-square, ANOVA, t-test, correlation, and linear and logistic regression.

We classify VARIABLES into two major types:

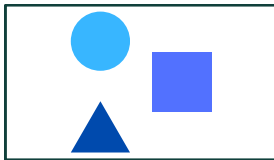
Qualitative (or categorical) variables

When categories express the data.

Quantitative (or numerical) variables

When numbers represent the data.

We classify QUALITATIVE variables into two types:



Nominal variables

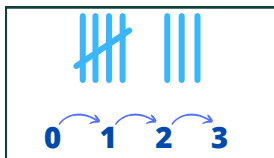
When the data are distributed into categories WITHOUT ordering (e.g., religion).



Ordinal variables

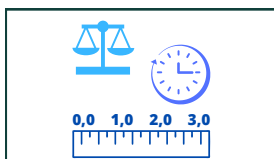
When data are distributed in categories WITH ordering (e.g., schooling level).

We classify QUANTITATIVE variables into two types:



Discrete variables

When it represents a count, taking on absolute values (e.g., number of children).



Continuous variables

When it represents a measurement, assuming fractional values (e.g., weight).

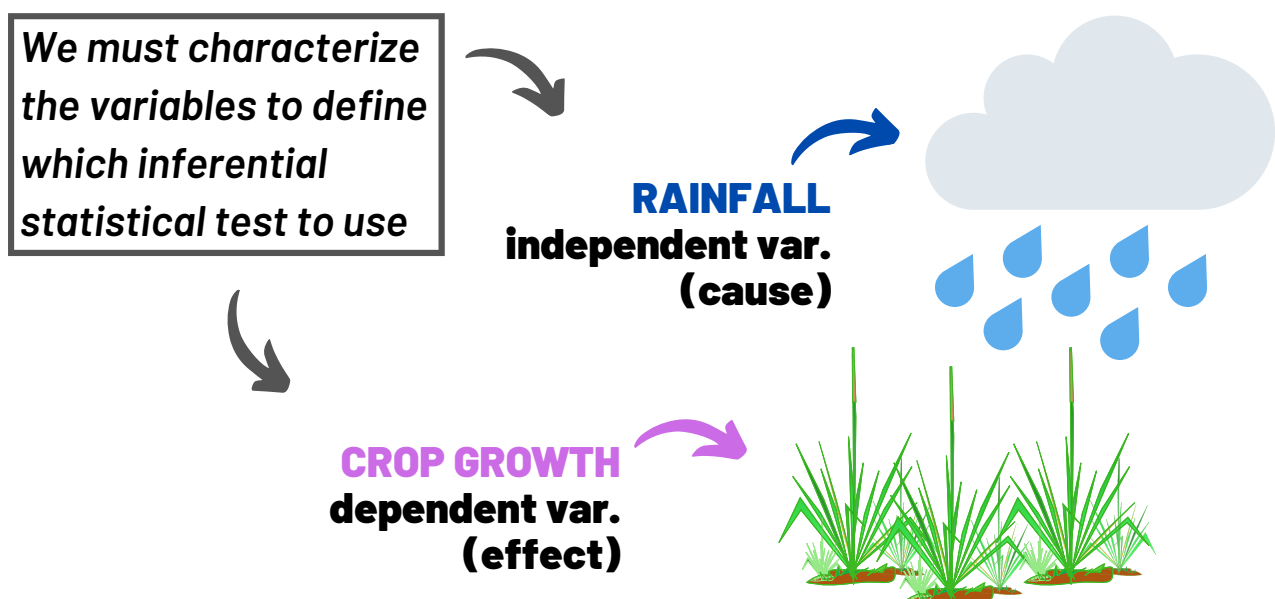
4. CAUSE & EFFECT

In **inferential statistics**, we often investigate the relationship between two variables.

One variable is identified as the **independent variable (X)**, which represents the cause or explanatory variable.

The other variable is identified as the **dependent variable (y)**, which represents the effect or outcome variable.

For **example**, we may investigate how rainfall (X) affects crop growth (y):



learn statistics easily

A document is shown with a stacked bar chart and a line graph. The bar chart is titled "Our company" and has a legend with three categories: "Sales", "Marketing", and "R&D". The line graph is titled "Business Sales" and has a legend with two categories: "2018" and "2019". The document is placed on a wooden surface.

CHAPTER 2

THE BEST FREE STATISTICAL SOFTWARE

1. THE SECRET

We will use one leading and two supporting software programs to create **graphs**. The best part is that all three software programs are **free**.

Furthermore, they have a user-friendly graphical interface and are **easy to use** without command lines or other complicated features.

With these software programs, you can effortlessly create **high-quality** scientific graphs.



learn statistics easily



CHAPTER 3

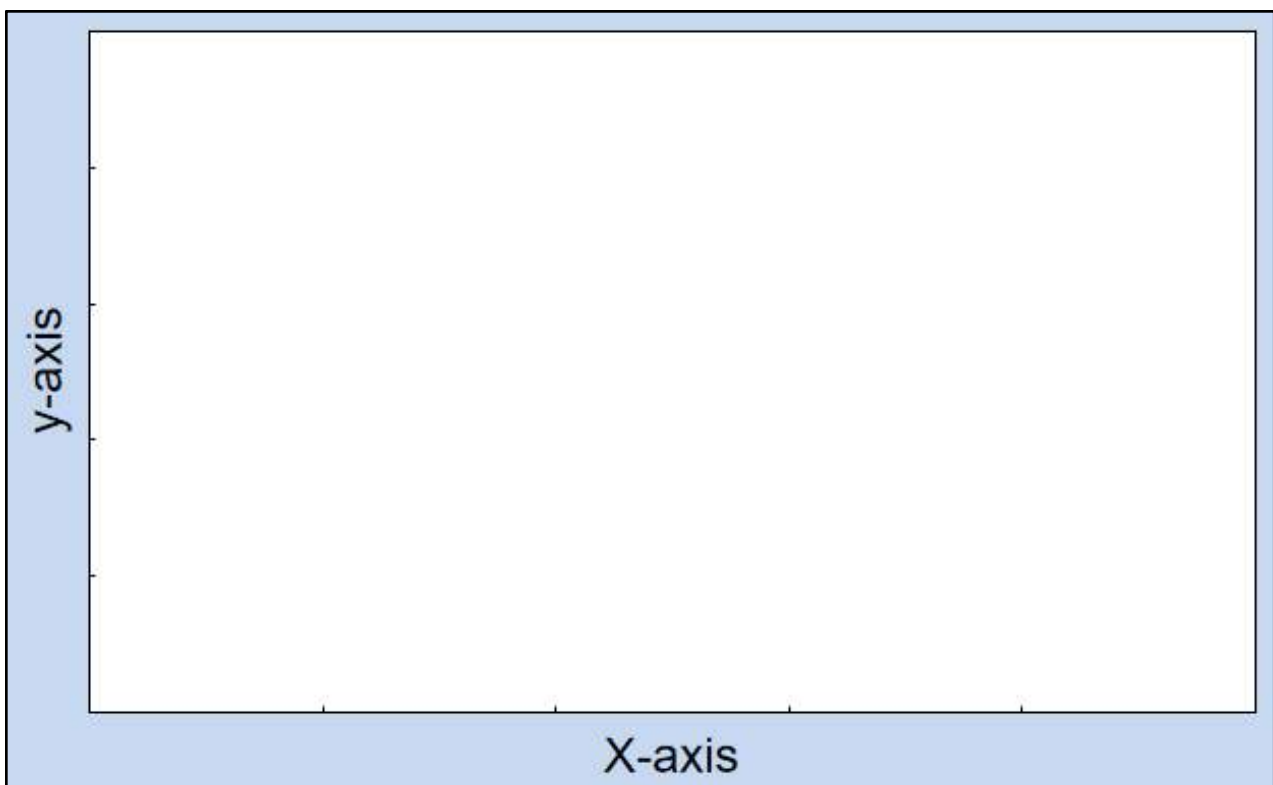
**HOW TO
CHOOSE THE
RIGHT GRAPH?**

1. THE BASICS

The most commonly used and informative graphs are **two-dimensional**, depicting two dimensions or two axes (X and y). These graphs typically support up to **two variables**.

To create a graph, we must first identify the variables we want to represent and determine their type, whether **quantitative** or **qualitative**.

*When using two variables in a graph, the independent variable should be on the **X-axis** (horizontal), and the dependent variable should be on the **y-axis** (vertical).*



2. NOW, FOLLOW THESE SIMPLE STEPS

(a) Identify the variables you want to graph.

(b) Determine the type of each variable, quantitative or qualitative.

(c) Designate which variable is the independent variable (X-axis) and which is the dependent variable (y-axis).

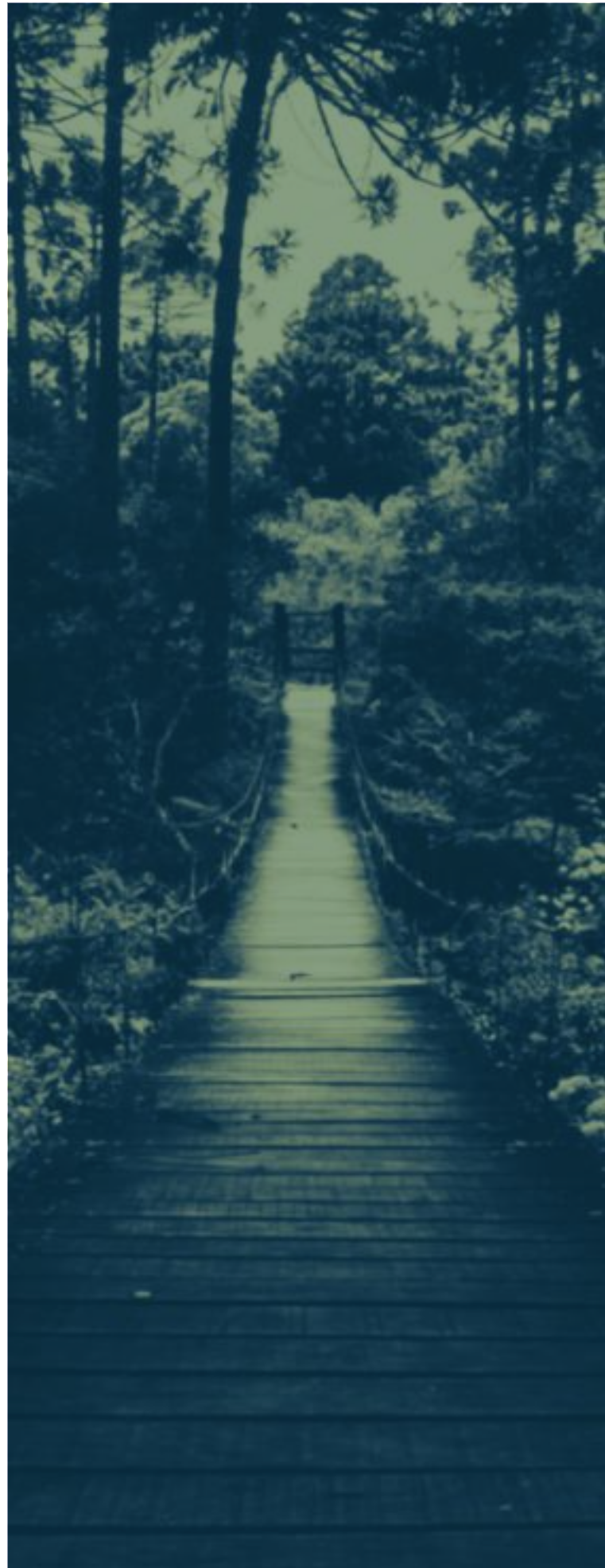
Example:

We want to determine if there is a relationship between rainfall and mosquito vector abundance.

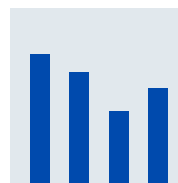
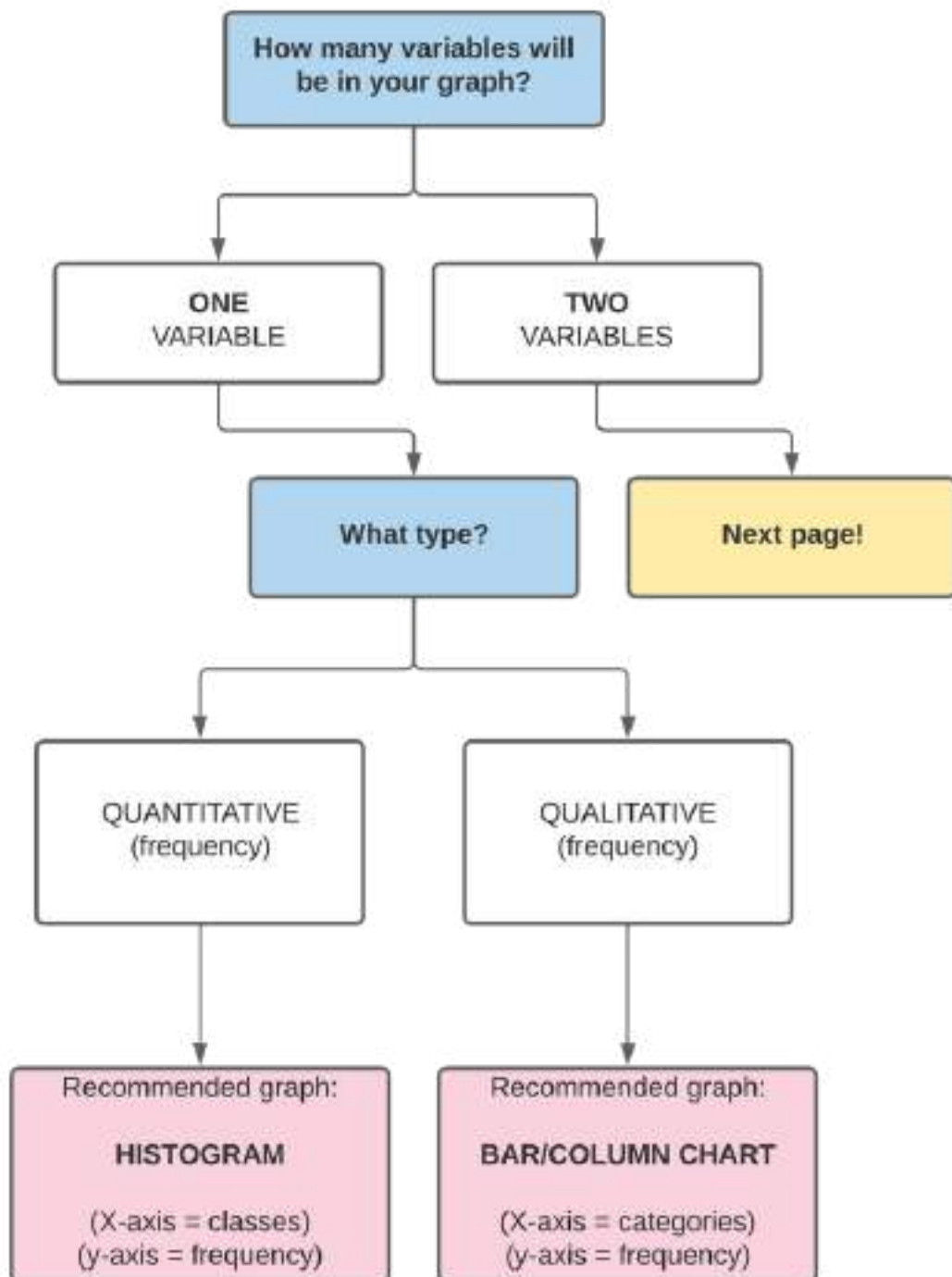
Step a: The variables are rainfall and mosquito abundance.

Step b: Both variables are quantitative.

Step c: The independent variable is rainfall (cause), and the dependent variable is mosquito abundance (effect).



THE FLOWCHART! (Part 1)



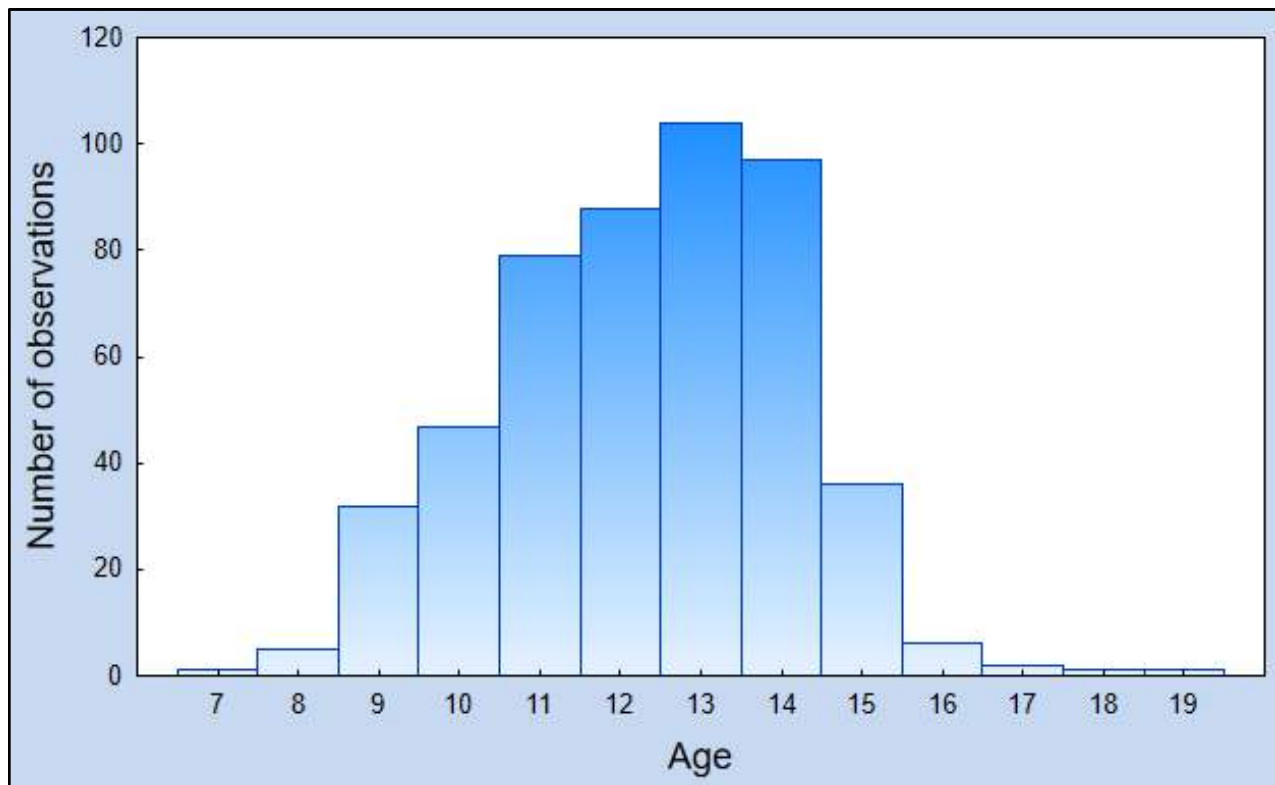
2.1 ONE QUANTITATIVE VARIABLE (FREQUENCY)

For representing the **frequency distribution** of a single **quantitative variable**, we need a graph that can accurately depict this information. This quantitative variable will be divided into classes before being represented on the graph.

What graph type should I use? A histogram.

Examples of variables: weight, height, wingspan, age, number of pups, density, temperature, rainfall, humidity, and concentration.

Example: consider a population of students and their ages. Since we only have one quantitative variable (age), we will use a histogram to graph this information. The software will create classes to represent the different ages in the population.



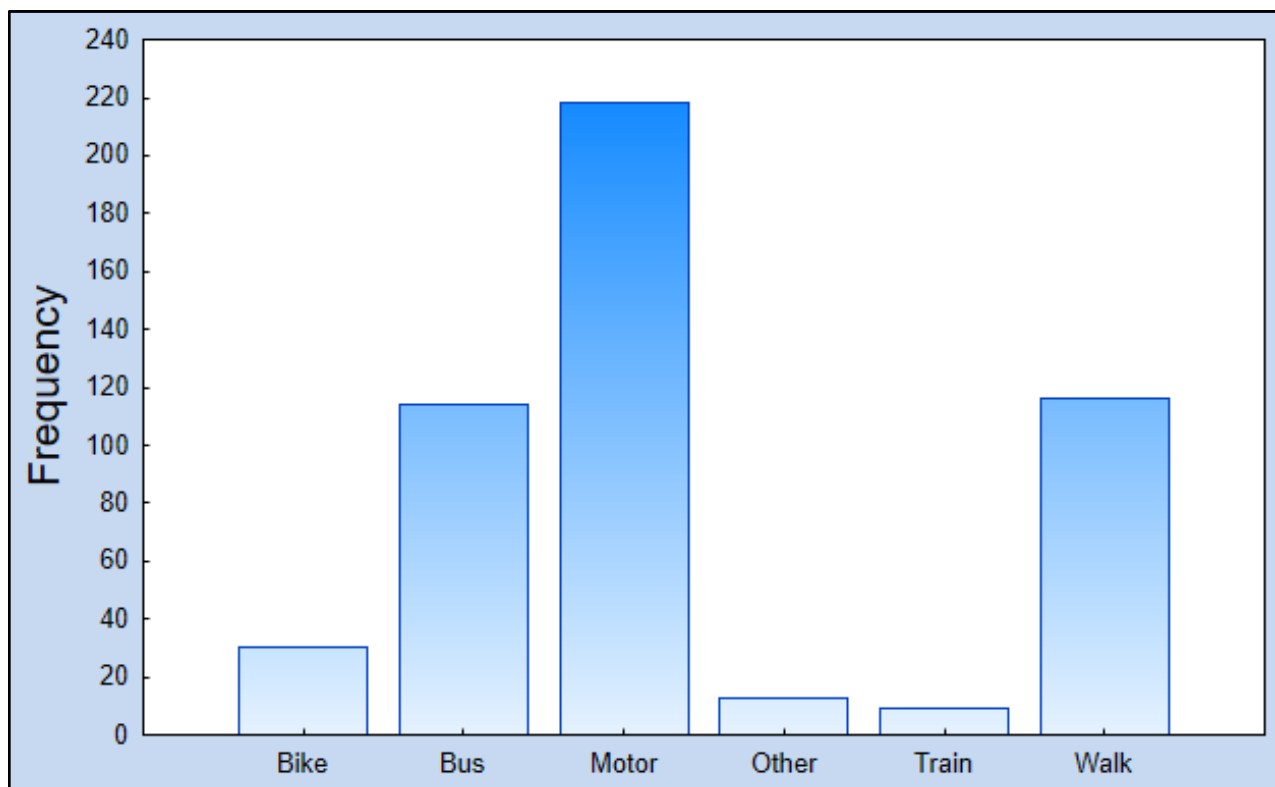
2.2 ONE QUALITATIVE VARIABLE (FREQUENCY)

We need a graph to represent the **frequency** (quantity or percentage) of each category that constitutes a **qualitative variable**. This graph is used to show a comparison of the categories' composition.

What graph type should I use? Bar/column plot or pie chart.

Examples of variables: Marital status, religion, biome, country, sex, eye color, smoker/non-smoker, sick/healthy, level of education, and month.

Example: How do students get to school? What mode of transportation do they use? We will graph students' frequency according to their transportation mode (travel).



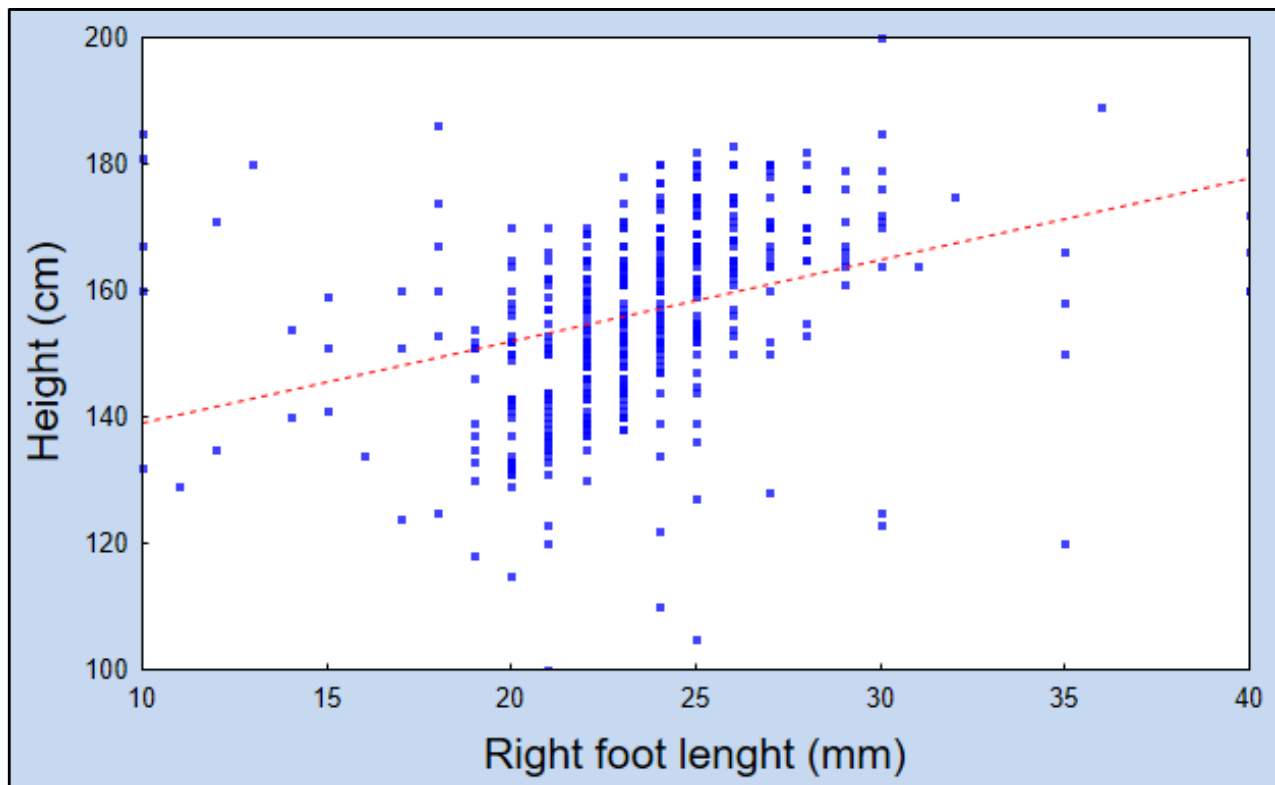
2.4 TWO QUANTITATIVE VARIABLES

We need a graph that represents the **relationship** between two quantitative variables.

What graph type should I use? A scatterplot.

Examples of variables: height vs. weight, age vs. BMI, elevation vs. temperature, rainfall vs. humidity, mosquito density vs. number of disease cases, temperature vs. number of drownings.

Example: To represent the relationship between the two quantitative variables, right foot length and height, in a population of students, we will use a scatterplot. We can also include a trend line in the graph. Each point on the graph represents one individual in the sample.



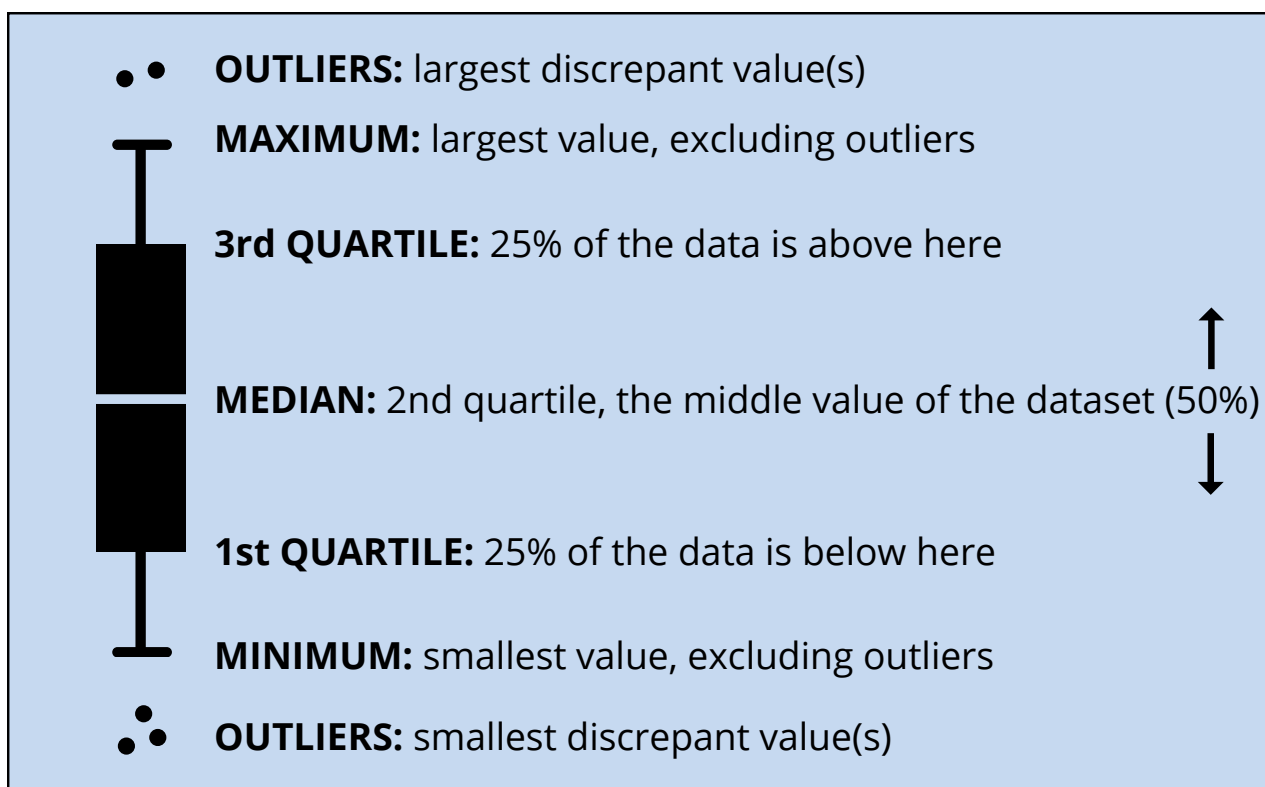
In general, the following **guidelines** are recommended:

(a) Use a **mean with error plot** to represent summary measures **mean** and **standard deviation** (or confidence interval).

(b) Use a **box plot** to represent summary measures **median** and **quartiles**.

The mean and standard deviation are only used when the data fits a normal distribution. If the data does not fit a normal distribution, use the median and interquartile range as measures of dispersion. This is discussed in **Volume I: Chapter 3**.

When interpreting a **box plot**, arrange the data in ascending order.



learn statistics easily

CHAPTER 4

**HOW
TO MAKE
YOUR GRAPH?**

3. THE MOST IMPORTANT RULE!

There is a **simple rule** that, when forgotten, can ruin any statistical analysis, producing completely wrong results.

This rule refers to the way you enter your data in the **spreadsheet**. It is essential that:

- (a) each variable occupies only one column;
- (b) each observation (sampled element) occupies only one row.

In the **example** below, we have each variable in its column (Name, Sex, Age, Height, Weight, and BMI). Each observation (the sampled element) occupies a row.

	A	B	C	D	E	F	G
1	ELEMENT	NAME	SEX	AGE	HEIGHT	WEIGHT	BMI
2	#01	Agatha	Female	11	54.33	105.822	25
3	#02	Alexander	Male	7	62.60	123.459	22
4	#03	Alicia	Female	6	64.57	125.663	21
5	#04	Amanda	Female	7	49.21	97.0034	28
6	#05	Anna	Female	6	55.12	108.027	25
7	#06	Andrew	Male	9	64.17	125.663	21
8	#07	Anthonella	Female	6	50.79	99.208	27
9	#08	Anthony	Male	8	60.24	119.05	23

Remember the concept of the relationship covered in

Volume 1: Chapter 1: Topic 5:

POPULATION: SAMPLE: ELEMENT: VARIABLE

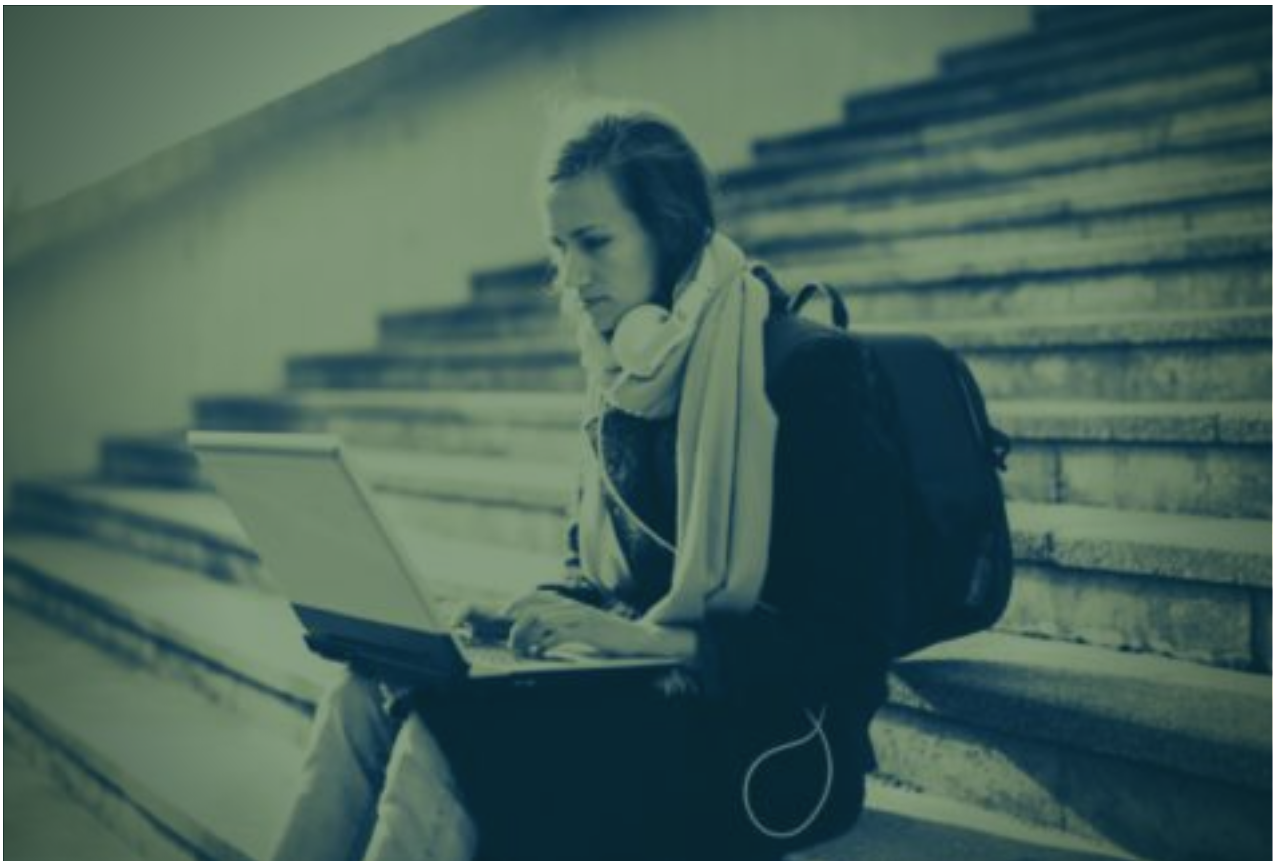
2. GET YOUR HANDS DIRTY!

You've learned how to choose the right **graph** for every situation and prepare your data in a **spreadsheet**.

Now, it's time to put your knowledge into practice by **creating** the graphs in the software programs outlined in **Volume II: Chapter 2**.

Make sure you have the three **required softwares** installed on your computer:

Let's get started!



WAIT!

IT'S NOT

OVER YET!

**DOWNLOAD VOLUME III
ON THE PLATFORM!**



@learnstatisticseasily

MORE INFORMATION ABOUT VOLUME III

The **Volume III** initiative is one-of-a-kind.

It allows us to incorporate topics suggested by our followers in each new edition.

And those who have already purchased the package will have lifetime access to these updates.

Volume III covers more advanced topics than those covered in the first two volumes.

As we plan to regularly update Volume III with new topics, we encourage you to send us your suggestions via our Instagram profile.



@learnstatisticseasily

APPLIED STATISTICS: Data Analysis
3 VOLUMES

Master data analysis with a simple and effective method that allows for fast results and autonomy in your studies

MasterCard VISA AMERICAN EXPRESS PAYPAL

~~\$47~~ \$27

MASTER DATA ANALYSIS QUICKLY, EFFORTLESSLY, AND WITH UNDENIABLE RESULTS

Discover our SIMPLE teaching method that will empower you to analyze your data on your own in no time.

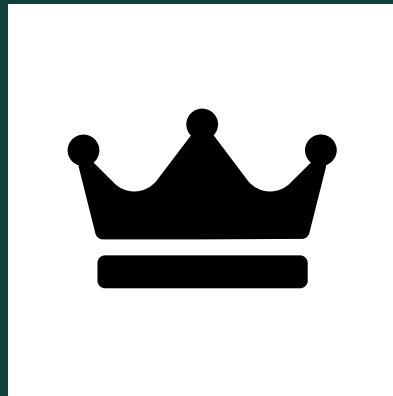
We cover ALL the essential steps and only what's truly necessary for analyzing your data.

Built on the proven principle that it's entirely possible to accurately analyze data without complex concepts or formulas.

This book will serve you well, even if you have no prior knowledge of statistics. *All 3 volumes are included in this offer.*

**GET YOURS BY
CLICKING HERE!**





Unlock the secrets to analyzing your data swiftly, effortlessly, and confidently.

Our SIMPLE approach focuses on teaching you precisely what you need to know to conquer data analysis.

Leave behind the complexities of concepts, formulas, and tables – this course proves that accurate data analysis is achievable for everyone.

This accessible resource is tailored for those with little or no prior knowledge of statistics.

Discover our unparalleled method for "*fast, easy, and confident data analysis*" – a game-changer you won't find anywhere else.



LEARN STATISTICS EASILY